

SCIENCE.

FRIDAY, OCTOBER 9, 1885.

COMMENT AND CRITICISM.

IF A REPUTATION for truthfulness, where the truth can be learned, and for plausibility, where things have to be guessed at, is of any value to a newspaper, the attention of our journalists should be called to their Washington news. We recently alluded to a supposed report to the first auditor, made by a committee which had been investigating the geological survey, and filled with a very detailed account of illegal proceedings in the work of that bureau. A pretended abstract of this report was telegraphed to the *New York Times*, of Wednesday, Sept. 16, to the *Boston Advertiser*, and perhaps to many other journals. We showed the report to be a clumsy fabrication on internal evidence. It now turns out that not only the report, but the committee itself, was purely imaginary. No such committee ever existed, and, of course, no such report was ever made by any responsible authority. The latest news is that, so far as Auditor Chenoweth has examined the accounts of the geological survey, he has found no illegality in its expenditures.

Coupled with the statements are certain alleged utterances of the auditor of such a character, that a suit for libel on his part ought to lie against the newspapers which have put them into his mouth. For example, that 'these gentlemen,' the scientific employés of the survey, would be required by him to do only such things as common people could understand. Apart from the calibre of mind which would be displayed by such a remark, the very act of attributing it to the auditor shows an ignorance of the duties of that functionary, which ought not to be tolerated in a Washington correspondent, unless, indeed, knowledge is regarded in his case as a disqualification by reason of its acting as a drag upon the flights of his imagination. At the risk of diffusing unwelcome knowledge, we will point out that the functions of an auditor are only those implied in his title. It is his duty to see that all government expenditures, which he is charged with auditing, are made in accordance

with the laws governing them. If he finds that an officer is spending money for any other purpose than that stated in the law which appropriates it, that he is paying extra salaries to employés, that he is employing more or other men than the law allows, or is in any other way deviating from legal requirements in his expenditures, he must stop him. But it does not concern the auditor whether an employé does, or does not, receive pay from an institution of learning, for the simple reason that there is no law against the officers of such institutions being employed in the government service. Nor can he inquire how an officer is employed, or whether his services are worth the salary paid him. All such questions as these belong to the head of the department to which the officer belongs, and it is for the Secretary of the interior alone to decide whether college professors shall be employed in the geological survey, and whether they shall do anything which common people cannot understand. The newspapers have, therefore, represented the auditor as usurping the functions of the Secretary of the interior.

Indefinite hints have now and then been given out that there was something wrong with Professor Baird's fish commission. Nothing has officially transpired except a brief correspondence with the auditor about the legality of erecting a 'residence building' at Wood's Holl. Professor Baird explains that this building was not erected, as the auditor seemed to infer, merely as a residence for the officers of the commission, but for the general work of the commission, and was called by the objectionable name because it contained the quarters necessary for the officers during the performance of their duties. One feature of this case has been entirely overlooked. Professor Baird's duties as fish commissioner are entirely gratuitous, as he receives no salary whatever from the government proper. The salary of the secretary of the Smithsonian institution is paid from the income of the Smithsonian fund, of which the government is the trustee, not the owner. We believe it contrary to sound principles that the government should ask or expect this class of services to be gratuitous. So long as

they are, the public will look with great lenity on the donor providing himself and his co-laborers with the necessary shelter, while they are engaged upon their professional duties.

AT A MEETING of the Brookville society of natural history, Sept. 23, a committee was appointed to confer with the scientific associations, educational institutions, and with individuals throughout the state of Indiana, concerning the advisability of the formation of a state academy of science, and if thought advisable, to coöperate with such persons in favor of the formation of such an association. Free expression of opinion is called for by the committee, both as to the need of such an organization and as to the best plan for its composition. It is now the plan to hold a meeting at Indianapolis between Christmas and New Year's day. It proposed that the organization shall enable the citizens of Indiana who are engaged in scientific work to meet at certain times "for social intercourse, for the exchange of ideas, and the comparison of results of scientific studies." It would appear from the prospectus that the academy would be a state society similar to the American association.

WE ARE INFORMED by Prof. Chas. A. Bacon, director of the Beloit college observatory, that the statement made in *Science* for Sept. 4, that the observatory had been closed on account of lack of funds, is incorrect. Professor Bacon states that, on the contrary, new arrangements have been made for carrying on additional observations in meteorology, and that especial attention will be paid to solar and spectroscopic work with greater facilities than before.

IN THE *American meteorological journal* for September, Dr. Daniel Draper, director of the Central park meteorological observatory, asks the questions, What is ozone? and Can ozone produce pneumonia? and he gives, for the months of January, February, March, April and May for each year from 1878 to 1885, the death rate from pneumonia for New York City, and the figures expressing the amount of ozone and the number of days on which it was present in the atmosphere, as shown by the continuous records of his observatory. The coincidence of the curves indi-

cated by the sets of figures—though possibly only accidental—yet seems sufficient to warrant further investigation of the matter, and would seem to call upon chemists to join now with physicists—who are making a special study of atmospheric electricity—to see if they can further clear up the doubtful relations between oxygen, ozone and electricity, and, perhaps, discover a simpler and more reliable method than the present, by which ozone tests or observations can be regularly made by meteorological observers.

THE PRESIDENT AND PROFESSOR AGASSIZ.

When it became known a few days ago that the President had invited Professor Agassiz to assume the direction of the coast survey, there was great satisfaction among those who desire that the principles of good government should be applied to the scientific bureaus as well as to the other executive offices. The independent position of Professor Agassiz, his administrative ability, and his acquaintance with the state of science in this country are so obvious, that even those who believe as we do, that a person trained in mathematical and physical science should be the head of the survey, must have seen that in the emergency Agassiz was a very felicitous choice. The announcement that he had been selected by the President for this responsible station was an assurance that the administration desired a man of unsullied name and of unquestioned ability to guide the affairs of the coast survey in the embarrassments which they have encountered. It removed the apprehensions which have been entertained that scientific work will not be encouraged by the party in power. It showed that the President and the Secretary of the treasury, in the difficulty which has arisen, are not indifferent to the survey, but are sincerely desirous of placing it under the direction of an able man, whose name and character would be the guarantee of success.

The health of Professor Agassiz precludes his acceptance, but he has another reason for refusing the office in question. In his opinion, the guidance of the coast survey requires an expert. The problems to be decided, the methods to be employed, the men to be engaged, should be determined by one who knows the business. Any other person would be in danger of failure. The culture of Agassiz is so broad and his experience has been

so varied, that he would have been an admirable man for the emergency, and even as a permanent head would have shown many admirable qualities. Nevertheless he is doubtless right in saying that four men can be named, two already in the government service, and two not so employed, who are qualified for the post by their acquaintance with the precise investigations which are prosecuted by the survey. One of these he hopes will be appointed.

From all that reaches us, we are persuaded that neither the President nor his advisers are hostile to the proper prosecution of the government work in science. If abuses have crept into any department, these abuses will doubtless be eradicated. As the corrections proceed, undue zeal may sometimes be shown by the subordinate reformers; individuals may neglect the considerations of courtesy and the deference due to those whose lives have been devoted without reproach to the service of the country; but the correspondence of Secretary Manning and Professor Agassiz is to us an assurance that science will not be retarded, and that scientific men will not be slighted by any act of President Cleveland.

BULGARIA AND BULGARIANS.

Forty-three years have come and gone since M. Cyprien Robert wrote that: "On the confines of Europe, there vegetates, enslaved and forlorn, a nation hardly known at the present day, but deserving all our sympathy. This nation is that of the Bulgarians, which has preserved, in the hardest state of slavery, its ancient manners, its lively faith, its noble character, and, after having had a glorious past, seems destined, by its geographical position, to play an important part in the future." Few political prophets have been happier in their prophecies. Since 1842 the Bulgarians, having acquired a national church and some educational facilities, have thrown off the cloak of listless barbarism which then enveloped them, have risen against the Turks, their masters, have been secured by the strong arm of Russia, with the consent of Europe, in a position of conditional independence, and now, at last, united and aroused, seem destined to free themselves entirely from the Turkish yoke, and, in time, perhaps, to become the European successor of "that multitudinous crime which we call the Ottoman government."

One must not ascribe everything to mere geographical position. National peculiarities have had

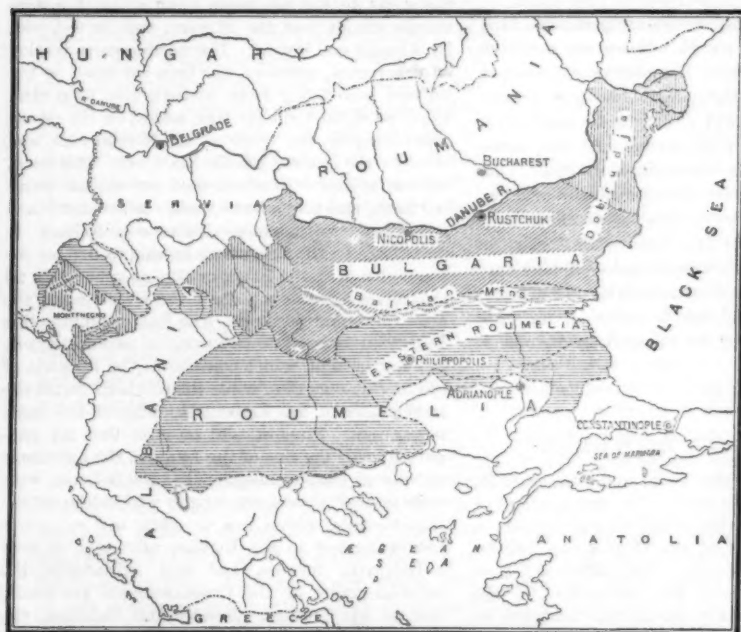
much to do with this progress, but a glance at the accompanying map will serve to show not merely the commercial importance of the country inhabited by the Bulgarians, but also that, in a purely strategic point of view, the Bulgarians hold the key to Constantinople. They may be said to inhabit an immense square, bounded on the north by the Danube from Widin to Silistria, and thence, in a direct line, to the Black Sea near Varna; on the east by the Black Sea itself; on the south by the peninsula upon which Constantinople stands, and the *Ægean*; and on the west by Albania and Servia. The northeastern portion of this region, however, has been colonized by the Tartars, who flying from Russian rule, soon after the close of the Crimean war, settled on the grassy plain lying to the north of the Roman wall, and between the Danube and the Black Sea. This plain, known as the Dobrudsha, soon proved too small for them, and they spread thence to the south and west for a considerable distance. Neither in strictness can the Bulgarians be said to live on the coast either of the Black or *Ægean* seas, as in all the towns on the sea coast the Greek holds the most important position. The Balkans divide this Bulgarian square into two unequal parallelograms, the northern of which constitutes the Bulgaria of the Berlin congress, while the southern forms the larger part of the Eastern Rumelia of the same instrument. Thus it will be seen that the Bulgarian holds the line of the Danube, the outermost defence of Constantinople; that the Balkans, with their difficult passes, are entirely within his control; that Shumla, which has so often and so prominently figured in the Russian advances, is now a Bulgarian fortress, and that Adrianople, the railroad centre of the Constantinople peninsula, lies on his borders. Besides this, Salonika, the military port of the *Ægean*, and Varna, that of the Black Sea, are almost at the mercy of an army having possession of the roads and the sympathies of the people of this region, even though the majority of the inhabitants of the towns themselves are inimical to the Bulgarians.

The Bulgarians of to-day resemble the other Slavic races of Europe more closely than they do the Turks or the Greeks. Yet, unlike the Servians and Montenegrins, they are not of pure Slavic descent, but are a Slavonianized race. Men learned in the languages profess to find in the Bulgarian dialect certain words and phrases which point to a Finnish origin; but there is an element, too, derived from Turkish and Persian languages; while some scholars, relying more on ethnological similarities than on philological analogies, declare the Bulgarian to be of Mongol extraction. Whatever theory is the true one, the Bulgarian differs

from the surrounding Slavic races in origin, and he has a more or less close affinity with the Russian, who has been described as a Slavonianized Finn with a dash of Mongol blood. This distinction of race is of the greatest importance as it explains, in a measure, how it was that the Bulgarian remained passive, while his Servian and Montenegrin neighbors maintained or secured their independence. Other things, however, also contributed to this result as, for instance, the banish-


by Englishmen, and whenever an Englishman writes on any phase of the eastern question his political predilections cloud his judgment. Thus an English tory has pictured the Bulgarian as 'a lazy drunkard and a fanatical fetishist,' while declaring, almost in the same breath, that the Turk is 'honest, sober, industrious,' and, furthermore, asserting that the 'purest family love exists in the harem as much as in any household of Europe.' The liberal, on the contrary, regards


'Turkish home life' as something to be avoided, and asserts that drunkenness is rampant among the Mussulmans, and that any Turk would murder a Christian for a few piastres. The Bulgarian, on the other hand, in the eyes of the English liberal, if not possessing all the virtues, is 'very industrious, penurious, and, although rather apathetic as a workman and employé, is to be preferred to all others.' The truth undoubtedly lies between the two extremes. It was the fortune of the present writer to pass a few days in Bulgaria some six years ago, to see



A SKETCH MAP TO ILLUSTRATE CHANGES IN TURKISH TERRITORY BY THE TREATIES OF SAN STEFANO AND BERLIN.

Bulgaria, shown thus:  17,300 Geogr. sq. m.

Territory taken from Turkey by treaty of San Stefano, and restored to her by Congress of Berlin, shown by horizontal lines:  30,700 " " "

Accessions to Roumania, Servia, and Montenegro are shown by  vertical lines:

ment of the old Bulgarian nobility, the nearness of Bulgaria to Constantinople, and the lack of homogeneity in the population of that country. For, although the Bulgarians put together outnumbered all other nationalities, the Turks and the Greeks (here, at least, working in harmony with their masters) formed an important element.

It is exceedingly difficult to come to any decision as to the exact place which should be given to the Bulgarian in the social scale. There is no lack of books on the Slavic provinces of Turkey, but, unfortunately, those of recent date have been written

a good deal of its inhabitants, and to have many long and interesting conversations with some western Europeans who were then employed on the Varna railway. The conclusions which have forced themselves upon him are at variance with those reached by the English tory.

In times past, and even at present, the Bulgarians might be called a superstitious race, but so might others nearer home; and it should always be remembered that until recently the Bulgarian had few educational advantages, except those afforded by our own American missionaries, who not only

taught many of them to read and write, but placed the Bible and some good school books within their reach. Then, too, the Bulgarian church dates only from 1870. Before that time the hated—and who generally deserved to be hated—Greek priest was his only religious adviser, and such being the case he preferred to go without religious ministrations. The Bulgarian drinks no more than do those about him of other races. He is fully as honest as they, which, to tell the truth, is not saying much for his honesty, and, when any incentive is offered, is as industrious—excepting, perhaps, the Crim Tartars, who seem to be an extraordinarily industrious race. But the Bulgarian is eminently superior to the Turk or Greek in his capacity for improvement, which is certainly very marked. Then, too, though surrounded by Slavic races, whose immorality is notorious, the Bulgarian woman—though protected by none of the safeguards which the Turks throw around their women—is above reproach; and on this account mainly Bulgarian home life is something almost unique in the east. The village Turk is an entirely different being from the Moslem of Stamboul, in that he is honest and industrious, but at the same time he is susceptible of little or no improvement. The future of the Balkan peninsula seems to lie in the hands of the Bulgarians, and it is undoubtedly the knowledge of this that makes the Greeks so restive at the threatened union of all the Bulgarians.

There is no room here to go into the causes of the late Russo-Turkish war. By February, 1878, the Russians had passed the Balkans and had drawn their lines tightly around Constantinople. On March 3, the negotiators of the two powers put their hands to a treaty of peace at the little hamlet of San Stefano, ten miles from Stamboul. There are many points worthy of notice in this treaty, but what concerns us at the present moment is the disposition that was made of the Bulgarians. By this treaty of San Stefano, that part of the Balkan peninsula lying between the Danube, the Black and Ægean Seas, Albania and Servia was formed into a great tributary state to be ruled by a Christian prince chosen by the Bulgarians themselves, in whose hands should be the administration and military police of the state, and provision was made for representative institutions similar to those of Roumania. The Turkish garrisons were to evacuate the country, which was to be confided for two years to the fostering care of a Russian commissioner and 50,000 Russian soldiers.

Of course England, then ruled by the Beaconsfield government, could not calmly stand by and see Russia acquire such a predominant position at the gates of Constantinople. Explanations were demanded, money voted, the reserves called out,

and war seemed almost begun when it was agreed to refer the matter to a European congress. The congress assembled at Berlin on June 13, 1878. A month later the Berlin treaty was signed. The map in the text will show the territorial modifications of the San Stefano treaty which were thus brought about. Servia and Montenegro, with considerable accessions of territory, were declared independent. Bessarabia, torn from Russia after the Crimean war and then given to Roumania, was restored to Russia, which now once again extends to the Pruth and the Danube. Roumania, which was declared independent, was recompensed with the Dobrudsha, Bosnia and Herzegovina were turned over to Austria, and the Porte was recommended—afterwards compelled—to give large portions of Epirus and Thessaly to Greece. The great Bulgarian state which Russia had endeavored to erect at the outposts of the Turkish capital was divided into two states. That north of the Balkans to retain the name of Bulgaria, and to have an elected Christian prince, and to be tributary only to Turkey. That lying south of the mountains to be governed somewhat like an English colony, and to be called, not South Bulgaria, for that might arouse national aspirations, but Eastern Rumelia. The internal police of this partially independent or conditionally autonomous province was to be in the hands of a native militia, and the Turkish army could not be sent into the province unless to suppress an insurrection or the like, and then only on notification being given to the 'powers.' The Ottoman government was to garrison the Balkan fortresses, which right, however, it promised not to exercise.

On the whole, the Berlin arrangement has not worked well in practice. Naval demonstrations and armed occupations have been necessary to compel its observance. On the 18th of last September the Bulgarians of Philippopolis—the capital of Eastern Rumelia—rose in rebellion and proclaimed a union of Eastern Rumelia with Bulgaria. Bulgaria accepted the union, and if Prince Alexander can maintain himself, the Berlin treaty will have been pierced in its most vital part. In closing this brief account of one phase of the eastern question, I am reminded of what Mr. Gladstone wrote of the "heartless manner in which the statesmen of a by-gone generation have argued for the maintenance of the Ottoman government with a view to the general convenience of Europe, while they have seemingly omitted from the case all consideration of the question, how far the Porte fulfilled or defeated the main purpose for which every government exists—namely, the welfare of those beneath its rule." The present crisis is merely the attempt of one of the subject

racers of Turkey, perhaps with the connivance of Russia, to seek its own welfare regardless of the general convenience of Europe.

EDWARD CHANNING.

THE LATEST SLIDES IN THE WHITE MOUNTAINS.

THE great slide of July 10, upon the north slope of Cherry mountain, has been described in *Science*, July 31. Since then others have been revealed at various localities, but particularly at Waterville. Upon August 13, the rainfall was excessive in that township. The fields and hillsides about Elliot's hotel were completely flooded and Mad River rose twenty or thirty feet. It transpired shortly afterwards that the famous slide upon the south side of Tripyramid had been renewed and enlarged, and that upon the north side of the same elevation its double had made its appearance. This last one is not visible from any of the White Mountain localities much visited, unless it be from the distant summit of Mount Washington. I had the pleasure of visiting both these slides September 10, in company with several gentlemen and ladies from the hotel. We walked up the northern slide first, ascended the north peak of Tripyramid, followed the ridge to the south peak and then descended the old slide to its base in 'Beckytown.'

Four slides converge into one at the upper end of the northern stream. Two of them are too precipitous to be travelled over with safety. Each of these tributaries may be about a half mile in length, while the united stream below is about a mile long. Its course lay entirely through the primitive forest, and it did not reach so far as Norway brook by a half mile. An immense pile of tree-stumps and roots marks its lower extremity. The ledges exposed are mostly of gabbro. From north Tripyramid one can see that the slides upon the westside of Mount Lowell—the old Brickhouse Mountain—have also been in motion the present season.

The old slide of Tripyramid started October 4, 1869, in that wonderful rainstorm which cost the state of New Hampshire between one and two millions of dollars for repairs. It has been fully described in the 'Geology of New Hampshire.' The first steep slope amounts to three-fourths of a mile, then the current bends at a right angle and flowed to Beckytown, a further distance of more than two miles, where the trees were deposited which marked the end. The new slide takes up nearly three times as much space at the beginning, but the flood was less abundant below the bend. During the sixteen years since the first catastrophe

bushes had grown over the base ground. Those were not quite all removed by the last floods, showing it to be less extensive.

The freshest which moved the boulder from the Flume in Lincoln (Franconia) three years since seems to have been more powerful than any of this season's slides.

C. H. HITCHCOCK.

AN HONOR TO AMERICAN OPTICIANS.

THROUGH the courtesy of Messrs. Alvan Clark & Sons, we are able to publish the following extract from a letter written to them by Dr. Otto Struve:

"I am asked by the government to inform you that, in acknowledgement of the excellent performances of the great object-glass, furnished for Pulkowa by your firm, his majesty, the Emperor, has been graciously pleased to confer upon you the golden honorary medal of the Empire. The value of this gift is enhanced by the circumstance that this medal is given very rarely and only for quite extraordinary merits. You and Repsold are the first who will receive it from the present Emperor, Alexander III.

"This circumstance produces some delay in the transmission, as the Emperor desires that the medal shall bear his portrait, and not that of his predecessors. Therefore the stamp must be newly engraved. When that be done, you will receive the medal through the Russian minister at Washington.

"When this letter reaches you I shall be on a journey through Germany and Switzerland. First I shall assist at the general meeting of the Astronomical association, at Geneva, and then must go for a cure to the well-known watering place, Carlsbad. Though my health is tolerably good at this moment, I feel still very tired, and from the illness of last winter there is left some affection that demands serious treatment.

"You will be pleased to hear that, with the 30-inch refractor in good nights all the most difficult double-stars, discovered by Burnham with the Washington refractor, can be easily measured. During the last weeks, Hermann has collected already some hundreds of measures on similar objects that were out of the reach of the old 15-inch refractor. . . .

OTTO STRUVE."

Pulkowa, July 23.

WEST AFRICAN ISLANDS.

MAJOR ELLIS, known as the author of 'West African sketches' and other works, accumulated the notes from which this volume was prepared,

during some fifteen voyages along the south and west coast of Africa. This book would be supposed from its full title to be a geographical or statistical work from a military point of view. It does indeed present facts of this character, but also much more. Written in an easy and unassuming style, the author has skilfully combined with an account of the chief geographical and economic features of the islands, a description of their attractions, their peculiarities, their odd or extraordinary inhabitants, and a great variety of extremely amusing anecdotes. We believe those of our readers who may be led by this notice to peruse it will find themselves abundantly repaid.

St. Helena is first described, rather briefly, as already much written about; then follow Ascension, Fernando Po, the Isles de Los, St. Vincent, San Antonio, Goree, Grand Canary, Teneriffe and Madeira. Some information of a strictly veracious character will also be found in regard to the miraculous island of St. Brandan.

One of the most singular spots is the Island of Ascension, which belongs to the British Admiralty, and is enrolled in the list of ships in commission under the title of 'the tender to H. M. S. Flora.' This originated in the fact that a vessel of that name was once anchored off the island as a store-ship, and part of the stores were kept on shore. Naval discipline is maintained, but a few ladies, wives of the officers exiled to this barren spot, are allowed to remain here, submitting to naval routine, which includes all lights out by 10 P. M. There is no water except intermittent collection of rain or dew, insufficient for the needs of the inhabitants. Nothing can be cultivated, though a few green things grow on the peak of one of the higher hills and in some narrow ravines which concentrate the scanty dews and showers. Sea turtles and terns, locally known as 'wide-awakes,' are the sole edible productions. Cows are brought there, and at first supply a small quantity of milk, which is reserved for the hospital. Should there be a surplus it is sold, a bell being rung to announce the event, but nobody is allowed to buy more than one gill. After a time the milk dries up and the cow is turned into beef to save her from starving to death.

An American returning to England on the same steamer with Major Ellis, went ashore to look at the island, and came near running against an officer with flaxen whiskers, who suddenly issued from a building. The officer raised his eye-glass, looked at the stranger with astonishment, and before the latter could apologize, called out: "Simmons!" A bearded seaman responding, "Ay, ay,

sir," appeared upon the scene. The officer continued: "Simmons, do you know what this person wants, or who he is?" "No, sir; I can't say, I'm sure, sir." The American began to explain: "Sir, I am a citizen of the United—" when the naval man interrupted him and said: "Simmons, do you think he is a stowaway?" "Can't say, sir, I'm sure," replied the imperturbable Simmons. "Is there a merchant steamer at anchor there?" "Yes, sir, Cape mail, sir." "Well, Simmons, just go to the officer of the watch, and ask if he has given permission to any person to board us. And, er—, see what this person wants." The American, now very angry, began again: "Sir, I am—" when he was again interrupted by the officer: "Simmons, I am engaged now. I cannot see this person. Perhaps you had better take him to the officer of the watch." And he went off before all the terrors of the United States could be launched upon his head; while the seaman, grinning respectfully, when his superior's back was turned, conducted the irate Yankee to the officer at the landing place, with whom he had but just come ashore. Sociable fellows, our British cousins, even on a desert island!

EDWARDS'S BUTTERFLIES OF NORTH AMERICA.

THE perseverance with which Mr. W. H. Edwards has continued his study of the butterflies of this country, and the liberality with which he has illustrated their various forms, ever since he first began the task, are worthy of all praise. The completion of his second series furnishes occasion to draw attention to its excellence. When Mr. Edwards first advertised, in 1868, that he would attempt a complete work, with ample illustrations, on the butterflies of North America, he probably little understood the nature of the task before him, or foresaw into what fields his work would carry him. Notwithstanding all he has accomplished, the horizon, broadening with his work is as distant as at the start. At first his iconography was almost exclusively given up to the mere description of species, with no attempt to illustrate anything but the perfect insect. Indeed, the work proceeded for nearly three years before the first illustration was given of the earlier stages of a single butterfly. Since that time but a single number has appeared which did not contain one

West African Islands. By Major A. B. ELLIS. London, Chapman & Hall, 1885. 8+322 p., 8°.

The butterflies of North America. By WILLIAM H. EDWARDS. Second series. Boston, Houghton, Mifflin & Co., 1874-1884. [445 p., 51 pl.] 4°.

or more plates devoted in part to the illustration of the earlier stages of our butterflies, while the text has constantly improved from that point up to the present time; a far larger proportion of the space being now occupied in treating of the biology and distribution of butterflies, and with their climatic and seasonal variations—the latter a study in which our author has taken the first rank in this country.

The first series of parts was completed in five years; the second has occupied more than ten for its issue. But the value of the second, with twenty-seven out of its fifty-one plates devoted in part to illustrations of the earlier stages, is beyond comparison more valuable than the first series, in which only nine out of the fifty plates contained any illustration whatever of the earlier conditions of the existence of these animals. As to the execution of the plates, no iconography of the present time excels them; in faithfulness and sobriety of color, in gracefulness of disposition upon the plates, in artistic execution and in faithful representation of the minutest details, they surpass anything that has been given to the world from the most famed *ateliers* of Europe. There is little inequality about them. They are uniformly exquisite, and lepidopterists the world over are indebted to Mr. Edwards for the faithfulness and luxury of his illustrations. By text and plates he has enriched the natural history of our native butterflies to such an extent, during the seventeen years in which these two volumes have been passing through the press, that the butterfly fauna of the United States is now quite as well known and illustrated as that of any equal region elsewhere, not excluding the long gleaned fields of Europe.

The manufacture of the book is equally creditable, with the single exception of the difficulty of reference. By the system adopted it becomes necessary to refer to plate 'Papilio 8B,' for instance, instead of to a single number. So also the text is unpagged, excepting in a few instances where it is separately pagged throughout a single part, as in 'Lycaena II.-III.' The author's intention is that at the close of the volumes text and plates shall be re-distributed and bound in an order fixed by himself, and then numbered in pencil; and he gives, therefore, a numerical order to the plates. But this is a most unsatisfactory method, and there is no index to the volume, so that any reference to the text is troublesome and vague.

In closing the first series of his 'Butterflies,' Mr. Edwards gave what he termed a 'Synopsis of North American butterflies,' with ample reference to the literature of the subject. This he has wisely discarded at the close of the present volume, substituting therefor a merely nominal list of species.

In this, however, in which the number of species is raised from 512 to 612, he retains in nearly every particular the antique classification adopted in the first volume. The studies which Mr. Edwards has undertaken upon the history of butterflies have rendered him an authority on that subject, and his skill in field investigation has been unexcelled. This, however, constitutes no claim whatever to any knowledge of the structure itself of butterflies, upon which classifications must be founded; and as he has shown no such knowledge in his writings, we can only regret that he did not altogether omit this list, since it carries an authority to the public eye which it does not possess, the classification being not only faulty in many minute particulars, but fundamentally false to nature.

LIPPS'S PSYCHOLOGICAL STUDIES.

THIS firmly and clearly-written volume is the work of a very acute and able man. No competent person will read it without wishing to read the other work to which its author refers,—his 'Grundthatsachen des seelenlebens' (Bonn, 1883). One can never do justice to a psychologist without knowing the *ensemble* of his views; and as we have not yet seen the larger volume, our own notice better be descriptive than critical. There are two essays in the work before us; one on visual space-perception, the other on the essence of musical harmony and discord; and both stick close to the particular matter in hand. In the space-perception essay, these topics are treated of: the nature of seen *distance*, the continuity of the field of view as connected with the filling out of the *blind spot*, and the *space intervals* seen between different retinal spots when the latter are excited. On all these subjects Dr. Lipps's views are thoroughly original. To take the last one first; it is an empirical fact that (distance and eye-position being equal) an object appears of about the same size to us, no matter on what part of the retina its image falls; why is this so? why, on the whole, do equal retinal distances correspond to equal extensions seen? The simplest answer is that they have an inborn tendency to do so, of which we can give no farther account. This answer is nowadays unpopular—notwithstanding the very great ability of some of those who defend it, first because it is the fashion to substitute *genesis* for *innateness* everywhere in our explanations just now, and second because there are *variations* in the judgments of size, shape, distance apart, etc., which we get from the same retinal tracts, under different

Psychologische studien. Von Dr. THEODOR LIPPS. Heidelberg. Weiss, 1885, 161p.

circumstances, and these variations seem often in a singular way to conform to what they would be like if the retinal excitements acted on the mind by *suggesting* space determinations learned in some other way. Even should the retinal tracts have innate feelings of extension of their own, the variations in question force us to admit that the innate extensions etc., are often overpowered by the suggestion of other and different ones. Thus the nativistic school of explanation is replaced by the 'empiristic' school, as Helmholtz calls it. The experiences, whose suggestions prove themselves to be so much more powerful than anything else, are, for these authors, on the whole, experiences of *motion*. The movements of the eyeball are the *deus ex machina* which shall solve all riddles. The excessive intricacy and delicacy of the facts to be interpreted can be estimated by the differences of opinion that still exist among the interpreters—many of them men of as great ability as our century has shown in any intellectual field. Dr. Lipps now rushes into their midst, and deals blows against the whole movement-theory that ought really to warm the hearts of its doubters. Whatever it be that measures off the field of view and establishes directions and distances between the impressions we get from retinal points, it is, according to him, neither muscular sensation nor feeling of innervation,—it must be something else. Let us say here, that however it may fare with Dr. Lipps's positive theories, this critical onslaught of his is a permanent achievement from which it will be hard for the muscle-theory to recover. 'Feelings of movement' and 'unconscious inferences' have too long run riot and had it their own way in the philosophy of vision. Being more or less hypothetical entities, one may construct very much what one pleases with them, and hitherto they have turned a deaf ear to critics. The champions of the feelings of movement can, however, hardly ignore Dr. Lipps's manner of calling their protégés to account.

Dr. Lipps's own theory is nativistic to the extent of admitting that if ever retinal impressions are discriminated at all, their difference will (by an inexplicable law) appear as a difference of position. It is however 'empiristic' first, in that it assumes that no discrimination would occur at all unless differently colored extended *objects* were what excited the retina in the first instance; and second, in that it makes the *average extension of the objects* determine the extension at which the various excited retinal points shall appear to us apart. Adjacent points everywhere on the retina are more likely to have a portion of one object than the boundary of two objects cast upon them. Distant points are more likely to be excited by different

objects than by the same object. Distant points will tend then rather to be discriminated; adjacent points rather to remain fused together. The object-experiences of intermediate points will have helped partly to separate them, partly to keep them together. The author seems to think that with a greater tendency of two points to be discriminated will go a feeling of their greater, and with a lesser tendency, a feeling of their lesser, distance apart—a point which he has not made theoretically sufficiently clear.

The tendency to be fused together until discriminated is for Dr. Lipps fundamental. That the borders of the blind spot should give images that are fused, and run into each other, that are without breach of visual continuity between them, is nothing peculiar. Every part of the retina is similarly continuous with every other, even distant, part. We see then space *continuous* over the blind spot. How much we see there is determined by the general law of discrimination. The two borders of the spot receive images sometimes of the same, sometimes of different objects, and the balance of their tendencies to fuse and separate is what will determine their apparent distance apart. A close study of the actual phenomena of the blind spot is apparent in this section.

The section on the perception of the third dimension, depth, or distance, is properly an expansion of Ferrier's commentary on Berkeley. Berkeley said we cannot see distance. Ferrier, the metaphysician, said we can see space only between two things both of which we see. We cannot see our own eye; *ergo* we cannot see the space between it and anything else. But such space is what is meant by distance; *ergo* we cannot see distance. Dr. Lipps enforces this by the most remorseless logic, denying that there is any properly so called visual *perception* of the third dimension at all. There is merely a conceptual *knowledge* of it. He makes a brave attempt to explain away the apparently direct sensational character of this knowledge, as when we look, for example, into the stereoscope; and he makes a heavy attack on Stumpf as the ablest advocate of a direct feeling of depth. He carries the discussion to a point, as it seems to us, where it becomes largely a matter of words. To admirers of Berkeley, however, it may be said, that nowhere has the original negative Berkeleyian doctrine about distance received anything like such able support as this.

In the essay on musical discord, our author reverts to the old-fashioned theory of a subtle sense for the incongruity of the rates of vibrations of the notes simultaneously heard. He shows by an interesting experiment how hard it is to hear one rhythm made outside of us, and to carry on a differ-

ent incommensurate rhythm ourselves, whether by movement, or inward time keeping. Helmholtz it is known explains discord by 'beats,' harmony by their absence; and melody he explains by the 'affinity' of the consecutive notes, i. e., the presence in them of identical over-tones. All these theories Dr. Lipps denies, to touch the essence of the matter; and reduces harmony, discord, and melody to the single positive principle of felt congruence or incongruence of vibratory rates. The paper is too technical to be gone into in more detail. All musical aestheticians should read it. It closes a little book, which, for acuteness, clearness and vigor, has not been surpassed for many a long year.

ASTRONOMICAL NOTES.

It appears from the latest reports we have seen that the new star in the Andromeda nebula (31 Messier) to which attention was first generally called by Hartwig's telegram, was discovered independently by several observers, one at least antedating Dr. Hartwig. Dun Echt Circular No. 98 announces that it was seen by Mr. Isaac W. Ward on August 19, and by M. Lajoye at Rheims, August 30. Baron von Spiessen at Winkel, in Prussia, seems to have noticed it on the evening of August 30, about 9½h., communicating his observation to Dr. Deichmüller by mail. On August 31, at 10h. 20m. Berlin mean time (before the arrival of Hartwig's telegram), Dr. Oppenheim turning his 3¼ inch comet seeker upon the nebula, noticed the new star-like nucleus and estimated it to be between the 5th and 6th magnitude. The new star was also independently discovered by G. W. Middleton, at Mexbro' Common, England, on September 3. Hartwig telegraphed the peculiar appearance of the nebula from Dorpat at 10h. 15m., August 31. We have the testimony of different observers that the star was not there in the early part of August. Hartwig estimated it at 7th magnitude on August 31, Oppenheim making it 5th to 6th magnitude, and Lamp 7.4 magnitude on the same evening. On September 1, and for several days following, it was variously estimated from the 6th to 7th magnitude, and since that time it has gradually grown fainter, the latest estimate (by Mr. Skinner, with the transit circle of the naval observatory, September 30) making it of about 9½ magnitude. On September 2 it was reported visible to the naked eye. In color it was called red and orange during the first week in September, but it now appears nearly white. We learn from the *Athenaeum* that Mr. Maunder examined the star with the large spectro-scope of the Greenwich observatory, describing the spectrum as of precisely the same character as that of the nebula, i. e., it was perfectly continuous,

no lines either bright or dark being visible, and the red end wanting, so that there is at present no evidence of any outburst of heated gas, as was the case with the star T Coronae in 1866, and Nova Cygni in 1876.

The Andromeda nebula, though probably composed of a great number of very small stars, has never been resolved. The spectroscope seems to show that it is not gaseous. Assuming that the nebula is stellar in nature, and that the 14th magnitude is the upper limit of any one of its component stars, then a rise from the 14th to the 7th magnitude indicates an increase in brightness of 631 fold, which renders it very improbable that the star is one of the constituent parts of the nebula. It seems rather more probable that it is a variable or new star which happens to be in line with the nebula as seen from the earth.

The following observations of the *Nova* were made with the transit-circle of the naval observatory, and, by permission of the superintendent, are herewith communicated. The estimates of magnitude are differential with respect to the star W² 0_h, 969 which follows the *Nova* about 2m., and is assumed to be 9.0 mag. Photometric observations of this star would be desirable:

Date. 1885.	Ob- server.	Mag- nitude.	1885.0					
			a			δ		
			h.	m.	s.	°	'	"
Sept. 17	W.	9.1	0	36	26.86	+40	38	12.6
" 23	P.	9.5			26.84			14.7
" 24	W.	9.6			26.87			13.8
1885.727		9.4	0	36	26.86	+40	38	13.4

Professor Pickering, in the Proceedings of the American society of psychical research (see *Science* vol. vi., p. 155) finds, from discussing a large number of observations, that the knowledge of a catalogue-magnitude of a star on the part of a recorder appears to exert through the medium of 'thought-transference,' no influence upon the independence of the observer's estimate of the same.

For the floating dome of the observatory at Nice it is proposed to employ a solution of chloride of magnesium of a density of 1.35, which will not freeze down to -40° C.

Comet 1885 II (Barnard). A conjecture having been expressed by Faye and Krueger that Barnard's comet might be periodic, Dr. Lamp, of Kiel, has computed elliptic elements and finds a period of 8,700 years. He remarks, however that, owing to the uncertainty in the single observations employed, his results can hardly be considered decisive, and the orbit may yet turn out parabolic.

GEOGRAPHICAL NOTES.

THE Italian corvette *Vettor Pisani*, commanded by G. Columbo, recently completed a three years' circumnavigation of the globe, with a suitable outfit and instructions for scientific hydrographic and biological work. The vessel left Italy early in 1882, provided with the most improved apparatus for sounding with wire. The officers to whom zoological work was entrusted were specially instructed at the Naples zoological station in the methods necessary for making satisfactory collections. The regions visited included both coasts of South America, from Pernambuco on the east, south to Magellan Straits, and north to Panama, the Galapagos and Hawaiian Islands, the China, Indian and Red seas, and so home. The results of the voyage are very satisfactory, many deep sea soundings having been taken, numerous charts corrected or resurveyed, general hydrographic information gathered, and a zoological collection accumulated which, for its fine state of preservation and preparation, is believed to exceed any collection ever made under similar circumstances.

The government of Chili has published an important work by Al. Bertrand, entitled 'Memoir on the Cordilleras and the Atacama Desert and adjacent regions,' which gives the result of explorations made during the period 1880-84, explains the system adopted, and maps on a large scale the region studied, beside giving numerous profiles. This work must form the foundation for any future discussion or description of the region acquired by Chili in the war recently terminated.

The last number of the *Mittheilungen* of the Vienna geographical society contains the annual summary of the president of geographical work (for 1884), beside the usual annual tables and reports. Among contributed articles is a valuable summary by Dr. Rink on the scientific work carried on in Greenland by the Danish government since 1876, and letters, nearly a year old, giving data on his last journey in Tsai-dam by Prjevalski. Breitenstein continues his interesting notes on Borneo, and especially on the Dyaks.

In the *Bulletin* of the Geographical society of Lisbon for 1883, but just distributed, Coelho has a long article on the chants and songs of Portuguese children, which have been collected by Senors Pires and Sequeira Ferraz. These have not only an ethnic interest for the anthropologist but the longer songs embalm fragments of popular tradition which have been sung by children without essential change from a very dim antiquity. Some of them are known to have existed in their present form as early as the 13th century. Probably the peasant life of the Iberian Peninsula has remained

less affected by the progress of civilization than that of any other area of equal extent inhabited by civilized man, and for this reason investigations into such topics are likely to have especial value.

The numbers of the *Bulletin* for 1885 contain articles on African exploration and on the island of Timor. Figueiredo also has an article on mediæval Portugal, with an excellent and interesting reproduction of a panorama of Coimbra as it appeared during the last quarter of the 16th century.

Some time since (*Science* No. 110) we referred to a journey by Mr. Richards of the east-central African mission in October, 1884, from Inhambane to the Limpopo River. The chief settlement of a tribe called Amagwaza, the town of Baleni was one of the localities sought, but want of time prevented the traveller from reaching it. We learn from the *Missionary herald* for September that on a second journey by Mr. Richards, beside visiting a large and hitherto untravellered area, was successful in reaching Baleni. He left Delagoa Bay on foot April 20, attended only by a Zulu convert and three porters. The Komati River, two hundred yards wide and thirty feet deep, was crossed about a day later in a 'dugout' canoe, and its course was followed for several days through unhealthy marshes swarming with insects. The river abounded with sharks, crocodiles and sea-cows. Leaving the river on the fourth day, a series of thirteen lakes was passed. Though there was no connecting stream at that season, the natives call this string of lakes the Liputa River, but there are often hills and bushy districts between the lakes. The country was hilly. On the seventh they emerged from the bush close to the Limpopo, and here Baleni was situated. Herds of cattle were visible in every direction, and clusters of small huts were very numerous. Manjobo or Manjova, the ruling chief, has several kraals on the west and one on the east side of the river, which here runs through a low flat plain of indurated alluvium 'as hard as marble.' The river banks are about two yards high, the stream being about fifteen feet deep and two hundred yards wide. Five sea-cows and eight crocodiles were seen at the crossing. Manjobo's kraal on the east side is called Emkontweni, the place where the spear is stuck in the ground. The chief is next in authority to Umganu, the son and successor of the celebrated Umzila, is very old, bald, and good natured, and commands the army of Umganu. The hostilities between his people and the Chobbas, or Machappas, have ceased on the latter agreeing to pay tribute. Previously they had been subject to raids which were little more than massacres, only the children being saved alive to be sold as slaves

to the Portuguese at Delagoa Bay, or kept in slavery by the victorious Amagwazas. The kraal is on the Limpopo, about twelve miles north of the Shangan River, which enters the former from the eastward, and is otherwise known as the Luize or Mitti River. From a hill just eastward of the Shangan the plain of Baleni could be seen extending northwest and southeast as far as the eye can reach, and about twenty-five miles in width. In the rainy season the plain is an immense pool or lake, and all the kraals are deserted for several months. Corn and millet reach a fabulous height; sweet potatoes, peanuts, melons, pumpkins, beans and bananas all seemed to flourish exceedingly. The Shangan is salt, but good water can be had by digging. The people call themselves Ama Shangani, and all the adults speak more or less Zulu, which is the language of the 'court.' Thence to Inhambane took nine days through a most populous country. Bingwana, a kraal of about 5,000 inhabitants, is about four days from Inhambane on the river of the same name, a deep but narrow stream, abounding in sea-cows. The route was considerably south of the one taken in 1884.

NOTES AND NEWS.

THE following extract from a letter of Mr. Louis Pasteur, to Professor Jules Marcou, dated Arbois (Jura), France, Sept. 7, is kindly furnished us by Professor Marcou. "I take a great deal of pleasure in the thought that, on my return to Paris, I shall present to the Academy of sciences an account of what I believe to be a very valuable prophylactic treatment against hydrophobia, applicable after the accident both to man and dogs. Do you not know some feature of this terrible disease which may be peculiar in America? Is it of frequent occurrence there? Remember that I should have the courage to apply my treatment even on persons who, after being bitten, had made the journey from Paris to America—although under these conditions at least two weeks must have elapsed since the accident—so great is my confidence in my method. However, I shall feel more sure of myself when I have made a large number of trials on man, which I shall do in 1885-86. I have as yet made but one trial—on an Alsatian boy, whose mother brought him to me. He had been bitten horribly on the fourth of last July, and death by hydrophobia seemed unavoidable. Up to the present time I have excellent news of his health, although it is sixty-four days since the accident."

—At the meeting of the American forestry congress, held in Boston, Sept. 22-24, the interest

displayed by the public was extremely little; the attendance averaging from fifty to a hundred. The following papers were read: Facts in regard to the present state of American forestry, State of forest legislation in the United States, by N. H. Egleston; Forests of California, Prentice Mulford; The Middlesex Fells, Elizur Wright; Massachusetts forestry law, Dr. George B. Loring; Arbor day, B. C. Northrop; Forest economy in Canada, Walnut culture in southern latitudes, Hon. H. J. Joly; What have the different states done in regard to their forests? J. S. Hicks; The forest laws of Colorado, E. T. Ensign; What are the requisites of an effective forest fire legislation, S. W. Powell; Spark arresters for locomotives, J. N. Lander; Relation of forests to floods, T. P. Roberts; Lumbering interests—their dependence on systematic forestry, J. E. Hobbs; Charcoal interests and the maintenance of forests, John Birkinbine; Lumbermen's waste as a fertilizer, B. E. Fernaw; Trees as educators, Prof. Edw. North; Arbor day celebration in schools, J. B. Peaslee; Seacoast planting—its importance, practicability, methods; August planting of evergreens, W. C. Strong; Recuperation of barrens by tree planting, B. G. Northrop; The osier willow and red cedar, E. Hersey; On the distribution of economically important resiniferous pines in the southern United States, and on the production of naval stores, C. Mohr; Profits of forest culture, B. P. Poore; The new version of the children in the wood, Rev. A. D. Mayo; Needs of a national forest policy, Hon. Warner Miller; Profits of forest culture, State of forest legislation in the state of New York, Hon. H. R. Low.

—The American astronomical society of Brooklyn, N. Y., issued in August last the first number of its publications, bearing the title 'Papers read before the American astronomical society,'—a pamphlet of thirty-two octavo pages. It appears to be a selection from the papers read before the society during the year 1884, and the first half of 1885; and among the papers we find, 'The disappearance of the water and atmosphere of the moon,' by Prof. George W. Coakley; 'On the structure and age of the universe,' by Garrett P. Serviss; 'Relation of sun-spots to meteorology,' by G. D. Hiscox. It is a matter of congratulation that a society in this country devoted solely to astronomy is to be found in such a flourishing condition as to be able to print its proceedings so promptly.

—Dr. D. G. Brinton of Philadelphia, has now in press the sixth volume of his Library of aboriginal American literature. It is the annals of the Cakchiquels, written by a native about 1500, and never

heretofore printed. The Cakchiquels were a semi-civilized tribe in Guatemala, and were reported by the first Spanish explorers to have annals reaching back 800 years before the conquest. The work will be printed from the unique original MS. in the peculiar alphabet of that tongue.

—The last volume (175) of the Philosophical transactions of the Royal society of London, contains a short report on the total solar eclipse of May 17, 1882, prepared by Captain W. de W. Abney and Dr. Arthur Schuster. The English party, of which Captain Abney and Dr. Schuster were members, observed the eclipse at Sohag, close to the bank of the Nile, in Upper Egypt. It will be remembered that during totality there was noticed by several of the observers a luminous streak near the sun, which, by the photographs, was proved beyond a doubt to be a comet; and it is shown as a very conspicuous object in a well-executed engraving accompanying the present report. The following description of the comet's appearance is given: "The nucleus is exceedingly well and sharply defined, the tail is somewhat curved; it did not point toward the sun's centre, but in a direction nearly tangential to the limb. The extent of the tail was roughly two-thirds of a solar diameter. . . . The different eclipse parties, present at Sohag, decided at a joint meeting, after the eclipse, to give the name of *Tewfik* to the comet, in recognition of the Khedive's generous hospitality." This curious discovery, during a total eclipse, of a comet which eluded all subsequent search has suggested to Dr. Holetschek, to enquire into the conditions which must be fulfilled by an orbit, that the comet should be hidden in the sun's rays during the whole time, that its absolute brightness might be supposed to render it otherwise visible. Such a calculation is not, of course, susceptible of any great exactness, but the results are, however, sufficient to show that the 'clandestine' passage of a comet, such as the eclipse of the sun surprised at Sohag, is probably not of so rare occurrence as we should at first be inclined to suppose.

—Recent statistics demonstrate that England has 65 square miles of colony to the square mile of her own area; Holland, 54; Portugal, 20; Denmark, 6.30; France, 1.90; and Spain 0.86 square miles. The area of the British colonies is nearly 8,000,000 square miles—rather less than the area of the Russian Empire, including Siberia and Central Asia; but if the area of the Native Feudatory States in India, amounting to 500,284 square miles, be added, over which England exercises as great control as Russia does over much of the territory under its sway, together with that of the United

Kingdom itself, 120,757 square miles, then the area of the British Empire exceeds that of the Russian Empire by about 200,000 square miles; and it covers within a fraction of one-sixth of the whole land area of the globe.

—A new Burmese embassy has been despatched to Europe. It consists of an ambassador, two secretaries, and two clerks. It is stated that some Burmese ladies accompany the party, and ten students, who are to be educated in Europe.

—The *Génie civil* publishes some interesting particulars with reference to the production and sale of petroleum in the Caucasus. There are about 400 wells in the vicinity of Baku, but only about half of them are at present being worked. The gross total of the petroleum extracted during the last three years is as follows:—800,000 tons in 1882, 1,000,000 tons in 1883, and 1,300,000 tons last year. Nearly the whole of this is converted into lamp oil at Baku itself, about a pound of good oil being obtained for three pounds of petroleum. There are 150 petroleum refineries at Tchorny Gorod (the black town), near Baku. In the course of last year, 200,000 tons of lamp oil, 190,000 tons of second-quality oil, and 500 tons of residuum were exported, these figures showing a slight increase over those for 1883 and 1882. The exports were distributed in about even proportions over the principal countries of western Europe.

—Herr Lüderitz of Bremen has always commissioned his agents on the west coast of Africa to make collections of the tools and utensils of the natives with whom they traded, believing that they would very shortly disappear before European civilization. The result of this policy is a very admirable collection of curiosities which Herr Lüderitz has now presented to the new Ethnographical museum at Berlin.

—In the *Comptes Rendus* for August 10, M. Crova describes a self-recording actinometer for giving a continuous record of solar radiation, and a plate shows the record of one day. It is principally valuable as showing the enormous and sudden fluctuations which are constantly going on in the atmospheric absorption of these radiations, thus confirming the results of Professor Langley's researches at Alleghany and on Mt. Whitney, and showing more graphically than anything else could do the tremendous difficulties with which he was obliged to contend, and the vast number of settings that must be made in these delicate quantitative measurements with the bolometer, in order to reach fairly average values of the ever-varying amount of energy that reaches us.

— At a recent meeting of the Deutsche gesellschaft für natur und völkerrunde Ostasiens, Dr. H. Fesca gave a paper on the agricultural circumstances of Japan in general, and of the province of Kai in particular. In the opinion of the author, wages in Japan are not less than in western Europe, especially in Germany. To this Dr. Wagener agreed, and added that apparent exceptions could always be traced back to purely local conditions. For instance, in many places porcelain was manufactured very cheaply, because the clay was prepared by the peasants quite incidentally; on their way to the field they took a basketful of clay from a pit in the neighborhood, delivered the raw material to a pounder driven by water found on the way, and on their return carried for little pay the ready pounded clay to a manufacturer. In the same way, Mr. Netto said, in many places gold is washed, where a regular trade would by no means pay; on rainy days, or when for any reason field work is interrupted, the people go to washing gold, since other work is not at hand.

— Concerning the little filaments of ice that appear on the surface of the soil after the first frost succeeding a heavy rain, W. Prinz (*Ciel et terre*, July, 1885) states that they are pressed out from the soil through small openings by the expansion of water in the ground as freezing proceeds. The size of the filaments depends upon the size of the openings through which they have been forced by expansion from behind, and the flutings with which they are covered correspond with irregularities in the walls of the openings through which they are forced.

— New Grenada possesses agricultural and mineral resources of the first order, which the opening of the routes across Panama will no doubt develop. The lower valley of the Magdalena, it is true, being formed of impermeable ground kept very moist by forests, is a seat of malaria and of yellow fever. The high valley of Honda is better favored, being much more permeable, less woody, and unvisited by miasma and fever. In revenge, however, the Indians and native blacks live in fear of leprosy, and all races are liable to the curious carathé, a disease which discolours the skin in places, more particularly the face, hands and feet. On the sides of the mountain, however, the climate is much more agreeable and very healthy. The population of New Grenada, a mixture of Spaniards, negroes and Indians, is about 2,000,000, and is spread over a territory much greater than that of France.

— At the Aberdeen meeting of the British association Lieutenant-colonel Playfair referred to the fact that the remains of magnificent Roman farms

were to be found on the sandy plains of Tunisia. The little hillsides were now nothing but sand, for the vegetable mould which once covered them has been washed away, and may now be found in the neighboring valleys buried beneath some feet of sand and water. No more striking instance of the importance of preserving forests could, in his opinion, be found.

WASHINGTON LETTER.

The society of science in Washington has its 'season' nearly as well defined as that of fashion, and almost coincident with the departure of the votaries of the latter is the setting out to various quarters of the globe of the representatives of the former. Not all, but a very considerable number of the scientific men of the capital are 'in the field' during the summer months, but they are there for work and not for pleasure, except such as is naturally incident to their more serious occupations. Just now they are beginning to reappear; the various scientific bureaus are taking on an appearance of initial activity, and the rooms of the Cosmos club, in which the various elements that go to make up human knowledge are wont to hold high carnival, are gradually losing that lonesome and deserted appearance which has been their chief characteristic for some months. It is to be presumed that these laborers have brought their harvest with them, and that during the coming winter they will be busily occupied in its threshing and winnowing, and in its dedication to the public good through the public printer.

In the meantime the home contingent has not been extremely small, nor has it been entirely idle. It is safe to say that in at least one case, that of the coast and geodetic survey, the affairs of the central office have, to an unusual degree, occupied the thoughts of those connected with it, and, indeed, of many others who are interested in the true welfare of government scientific work. Among such, general satisfaction was expressed with the action of the administration in the selection of Professor Agassiz as its superintendent, and great disappointment that he felt constrained to decline the responsibility. Under decidedly unfavorable conditions most of the regular work of the survey has gone on without serious interruption. One of the veteran observers of this corps, Mr. George W. Dean, was in the city a day or two recently, having returned from a longitude campaign at Colorado Springs and various connecting points.

In the geological survey, while the geologists, topographers, etc., have spent the summer in the field, the chemical laboratory under Professor

Clarke has been almost constantly in active operation. Mr. Hallock has spent some time at the Watertown arsenal, utilizing its great testing machine in certain important pressure experiments. This work will be continued, and will include a repetition of some experiments already made by others under less favorable conditions as well as a number of new researches. The survey has recently published Bulletin No. 14, on 'the physical characteristics of the iron-carburets, etc.,' the joint work of Carl Barus and Vincent Strouhal. This treats especially of the electrical and magnetic properties of steel and cast iron, and is a really valuable contribution to our knowledge of these important metals. Much of the work was done while Mr. Barus was in Europe working in conjunction with Strouhal; some of it has been previously published in certain European journals. Many additions have been made, however, by Mr. Barus since his connection with the survey, and the whole now appears for the first time in English, in a volume of more than two hundred pages.

Professor Riley of the Department of agriculture is now revising the final proof sheets of the 'Fourth report of the U. S. entomological commission.' This report is on the cotton worm, being the final report on the same, together with a chapter on the boll worm. It will contain sixty-four plates and about five hundred pages of text. Three thousand copies have been ordered printed by congress. The preparation of this report was virtually completed in 1882. A part of the delay in its publication is due to a desire on the part of the entomologist to complete some special researches, and especially to obtain a more exact knowledge of the facts in reference to *Aletia* in Brazil, as bearing on the hibernation and introduction of the species within the States. To this end Dr. John C. Branner was sent to Brazil, remaining there about four months and returning with a large amount of interesting material, which has been utilized in the report. Again, the work of the preparation of this volume has necessarily been made secondary to that of the entomologist in a general way, including the issue of special bulletins and annual reports. But no small portion of the delay is to be attributed to the difficulties incident to the publication of such scientific reports by the government. During the winter season when the authors of scientific papers can naturally give more attention to their publication, the public printer finds it necessary to devote the energies of his establishment to the printing of miscellaneous congressional and other public documents. In the summer the naturalist is in the field, occupied with the prosecution of research, and has little leisure for liter-

ary or editorial labors. Yet it is a fact that the report was formally submitted in March, 1884, the bulk of it was in type and the illustrations prepared by the fall of that year. It is to be hoped that no further delays will prevent its being placed in the hands of the public at an early date.

The entomological commission, consisting of Professors Riley, Packard and Cyrus Thomas, has now prepared four large volumes, three of which have been published, one is about to be issued, and a fifth is in preparation. The whole embodies the results of the work of the commission, which has been in existence about five years.

The naval observatory has just issued its annual volume containing the 'Washington observations for 1881.' Besides the usual astronomical and meteorological observations, it contains two appendices by Professor Hall, one on the satellites of Uranus, and the other on the satellite of Neptune. It is pleasant to reflect that these publications are of permanent and lasting value. Their tardy appearance would otherwise seriously interfere with their usefulness. No systematic study of the new star in Andromeda has been made at the observatory. It has been examined from time to time by several of the astronomers, and a few measurements of position have been taken. The navy department is engaged in the construction of a magnetic observatory in the grounds of the naval observatory. It is understood to be under the charge of the bureau of compasses.

A seismological conference was held in the office of the director of the geological survey about a year ago, in which were representatives from the survey, the signal service, the naval observatory, and a few persons not in government employ, who have long been interested in seismology. The proceedings were noticed at length in this journal at the time. The explosion of a vast amount of dynamite at Flood Rock offered an opportunity for the study of what might be called an artificial earthquake, and it was determined to take advantage of it and make such observations as were found to be possible. The uncertainty as to the exact time of the explosion, and the difficulty of obtaining information concerning it, prevented such complete preparation as would have been desirable and possible under other circumstances. Circulars were sent, however, to directors of astronomical observatories in the neighborhood of New York City, requesting co-operation, and by direction of the director of the geological survey, the chief signal officer and the secretary of the navy, Professors Clarke, Mendenhall, and Paul, will go to New York, to utilize in the best possible manner the instrumental appliances at hand. Several seismoscopes are nearly completed, and a seismograph well under way for

the use of the organization referred to above, but the limited time will not permit of their being gotten ready for use on this occasion. The results of the observations made will be looked for with interest.

At the national museum the employés have been busy for some time in arranging the exhibits received from the New Orleans exposition. Many of these were sent from the museum originally, and are only now being returned to their places; but many were not, and, in fact, it is stated that the museum has been a great gainer in the operation. It is said that one thousand boxes were sent to New Orleans, and that two thousand have been received from there, all of which goes to prove that the officers of the museum, and particularly its representatives at New Orleans, are alive to the interests of the great and rapidly growing collection, and is also conclusive evidence that a rolling stone does sometimes gather moss.

Z.

Washington, D. C., Oct. 5.

LETTERS TO THE EDITOR.

. Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

The color of the sky.

I read with interest the communication of Prof. E. L. Nichols on the above subject published in *Science* September 11. As the views there expressed (that the color is really only a subjective phenomenon) run quite counter to those generally held, it seemed desirable if possible to confirm or disprove them. Everyone who has used a spectro-photometer is well aware that it is an instrument with which it is impossible, even when most carefully handled, to obtain results of great precision. It, therefore, seemed to me preferable to compare directly the colors of the sky, and the illuminated sheet of paper.

For this purpose I employed a polarimeter, consisting of a tube furnished with a double-image prism at one end, and a revolving Nicol prism at the other. Before it, in the sunlight, was laid a mirror, half of which was covered with a sheet of white paper. Between these and the instrument was placed a sheet of black paper suitably screened from the sunlight, and containing two square holes, through one of which the illuminated paper was seen, and through the other the blue sky reflected in the mirror. The instrument was then used in the ordinary manner, being so placed that one of the images of the illuminated paper was in contact with the oppositely polarized image of the reflected sky. The Nicol was then turned till the two were of the same brilliancy, and the colors compared. There was no question but the sky was decidedly the bluer of the two. The tube carrying the double-image prism was then rotated about its axis through 180°, to allow for any difference of color which might have been introduced by the polarization, no appreciable change, however, was noted. The white paper was next removed, and some of a bluish tint substituted, but it was not until paper of a decided sky blue color was employed, that an accurate match could be obtained. Since then the color of the reflected sky matches that

of blue paper illuminated by direct sunlight, and does not match that of white paper so illuminated, it seems clear that the color of the sky is something distinctly inherent to itself, and is not a subjective phenomenon as supposed.

Further evidence bearing upon this subject, collected by Prof. E. C. Pickering from polarimetric observations of the sky will be found in the *Proceedings of the American academy*, vol. ix., p. 20.

WM. H. PICKERING.

Woodhead and Hare's 'Pathological mycology.'

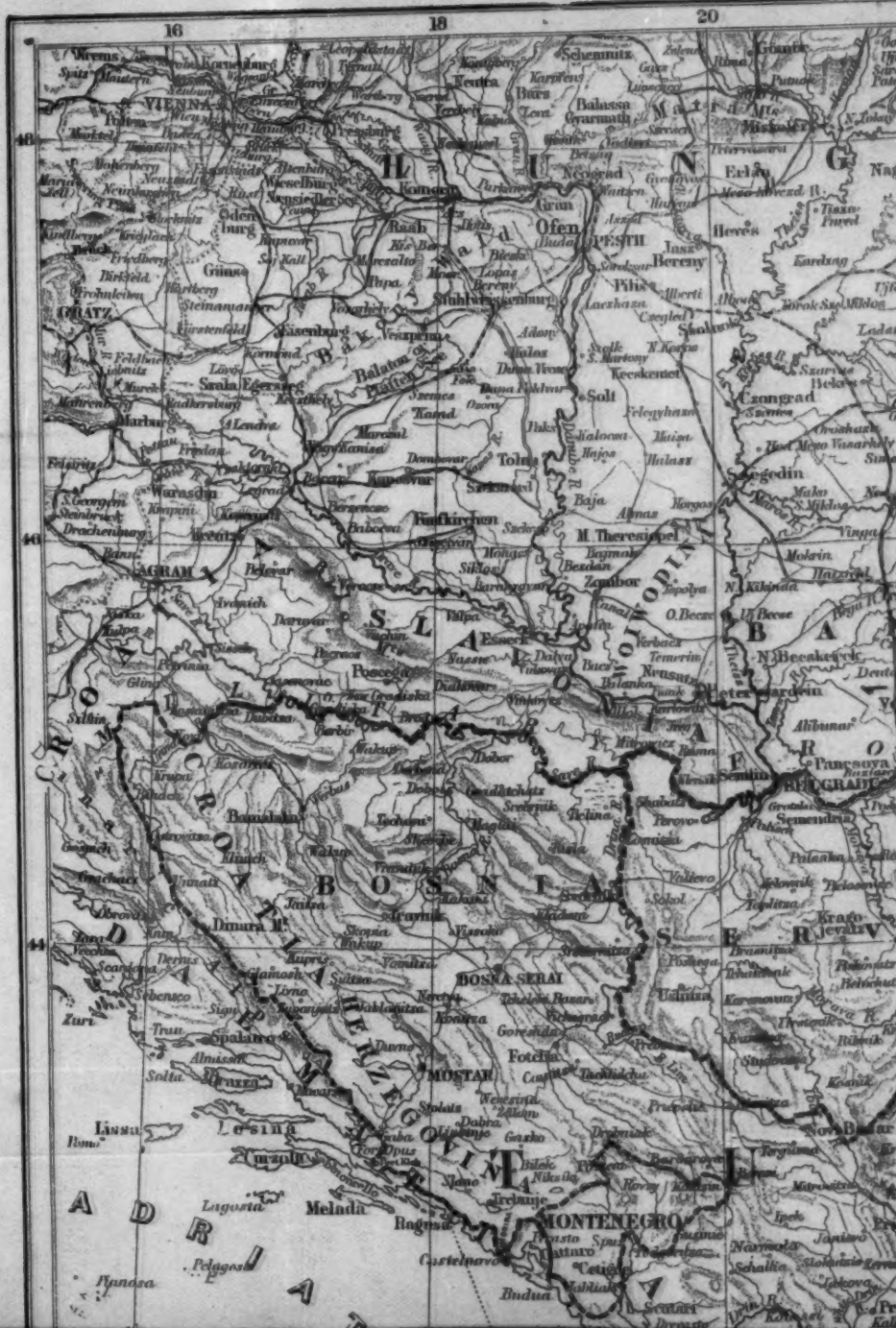
Permit me to add a few corrections to those recently made by a correspondent concerning this publication, (*Science*, Aug. 14). The authors state on p. 17 that "in artificial media it is a frequent experience to find organisms destroyed by the virulence of their own products before all food material has been exhausted." I doubt very much whether this observation has ever been made. *A priori* it seems unreasonable to suppose that bacteria would commit suicide so speedily. It is well known that the products of fermentation may check the process after a time, but the organisms survive for some time after. Pasteur's method of attenuating the virus of fowl cholera depends on the act of allowing months to elapse before a new culture is made. I have still to find a microbe which dies in a liquid medium within, at least, two months after inoculation.

The authors seem to think that when fluids are not albuminous they will not adhere to the coverglass when dried and heated, hence the method of irrigation is recommended (p. 46). As the method of staining on the coverglass is of fundamental importance, it seems strange that such a statement should be made. In fact the dried layer from albuminous fluids is very apt to be washed away, while the ordinary 'broth,' from which probably all albumen has been precipitated by heat in sterilizing, always forms a firm layer. I doubt whether any one will succeed well in staining and washing bacteria by irrigation. They will, very likely, find their way to the blotting-paper used to stimulate the current. Had the authors followed Koch, as closely here as elsewhere, this error would not have occurred, as he is very explicit on this point.

In the formula, for Cohn's fluid given on p. 111 'as recently modified,' we find, by comparing with the most recent foreign publications (Zopf, Flügge, Hüppe, Cornil and Babes) that the quantity of all the salts but one is from ten to twenty times too great. It would be desirable to know to whom the modification is due. I do not believe that bacteria, parasitic or saprophytic, would appreciate such a concentrated solution.

There are many indications throughout the work that the methods and processes described were not fully mastered by the authors themselves. Thus, on p. 75, filters are to be washed with 'boiled distilled water,' even though the filtered gelatine must be subsequently sterilized by steaming the stock flasks for fifteen minutes (p. 76) which is, at least, five minutes too long, and would certainly ruin the gelatine. After removing the potatoes from a solution of mercuric chloride (p. 62), why not rinse them in boiled distilled water, where its employment might do some good? Finally, the use of caustic potash or turpentine for cleaning slides (p. 51) seems a rather unpardonable suggestion.

THEOBALD SMITH.









MAP SHOWING REGIONS AFFECTED



REGIONS AFFECTED BY THE RECENT REVOLUTION IN BULGARIA



SCIENCE, October 9, 1885.

IN BULGARIA.